



US011650531B2

(12) **United States Patent**
Kaiga

(10) **Patent No.:** **US 11,650,531 B2**
(45) **Date of Patent:** **May 16, 2023**

(54) **IMAGE FORMING APPARATUS INCLUDING USER INTERFACE UNIT FOR INPUTTING OR OUTPUTTING INFORMATION**

- (71) Applicant: **CANON KABUSHIKI KAISHA**, Tokyo (JP)
- (72) Inventor: **Miho Kaiga**, Shizuoka (JP)
- (73) Assignee: **Canon Kabushiki Kaisha**, Tokyo (JP)
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **17/207,484**

(22) Filed: **Mar. 19, 2021**

(65) **Prior Publication Data**

US 2021/0302883 A1 Sep. 30, 2021

(30) **Foreign Application Priority Data**

Mar. 24, 2020 (JP) JP2020-052383

- (51) **Int. Cl.**
G03G 15/00 (2006.01)
H04N 1/00 (2006.01)
H04N 1/44 (2006.01)

- (52) **U.S. Cl.**
CPC **G03G 15/5016** (2013.01); **H04N 1/00352** (2013.01); **H04N 1/00557** (2013.01); **H04N 1/00891** (2013.01); **H04N 1/442** (2013.01)

- (58) **Field of Classification Search**
CPC G03G 15/5016; H04N 1/00352; H04N 1/00557; H04N 1/00891; H04N 1/442
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 2010/0073295 A1* 3/2010 Zhan G06F 3/021 345/168
- 2012/0027488 A1* 2/2012 Ootoshi B41J 33/54 400/223
- 2013/0083344 A1* 4/2013 Funakawa H04N 1/00127 358/1.14
- 2015/0131121 A1* 5/2015 Kang H04N 1/00472 358/1.15
- 2019/0300357 A1* 10/2019 Crawford G06Q 20/40145

FOREIGN PATENT DOCUMENTS

- EP 0501789 A2 9/1992
- EP 0571158 A1 * 11/1993
- JP 2000-015891 A 1/2000
- JP 2006181803 A 7/2006

* cited by examiner

Primary Examiner — Moustapha Diaby

(74) *Attorney, Agent, or Firm* — Canon U.S.A., Inc. I.P. Division

(57) **ABSTRACT**

An image forming apparatus includes an image forming unit configured to form an image on a recording material, a controller configured to control the image forming unit, a sheet feeding tray configured to store a recording material to be supplied to the image forming unit, and a sheet feeding tray cover configured to cover an access point of the sheet feeding tray. The sheet feeding tray cover includes a user interface for inputting information into a controller unit or outputting information from the controller.

12 Claims, 8 Drawing Sheets

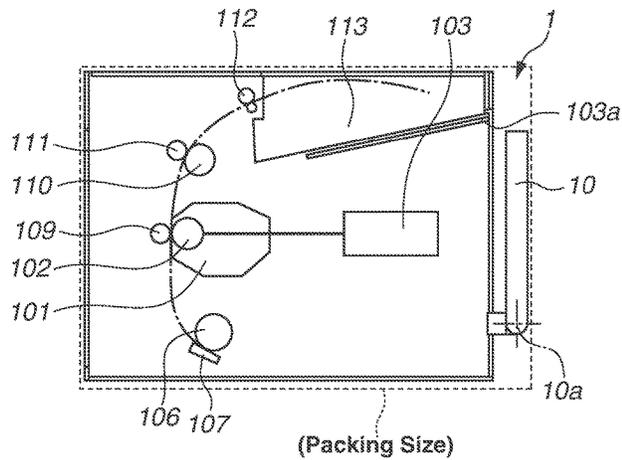
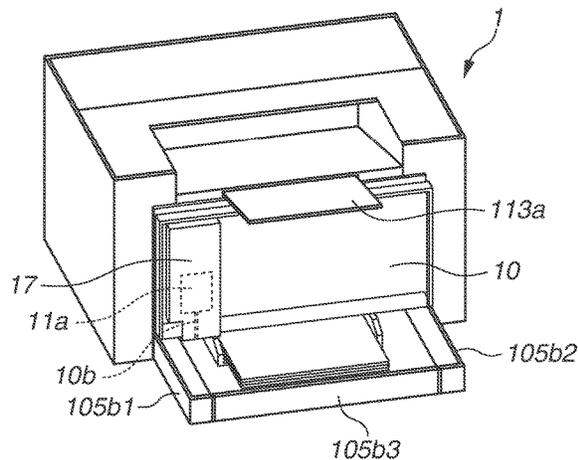


FIG. 1

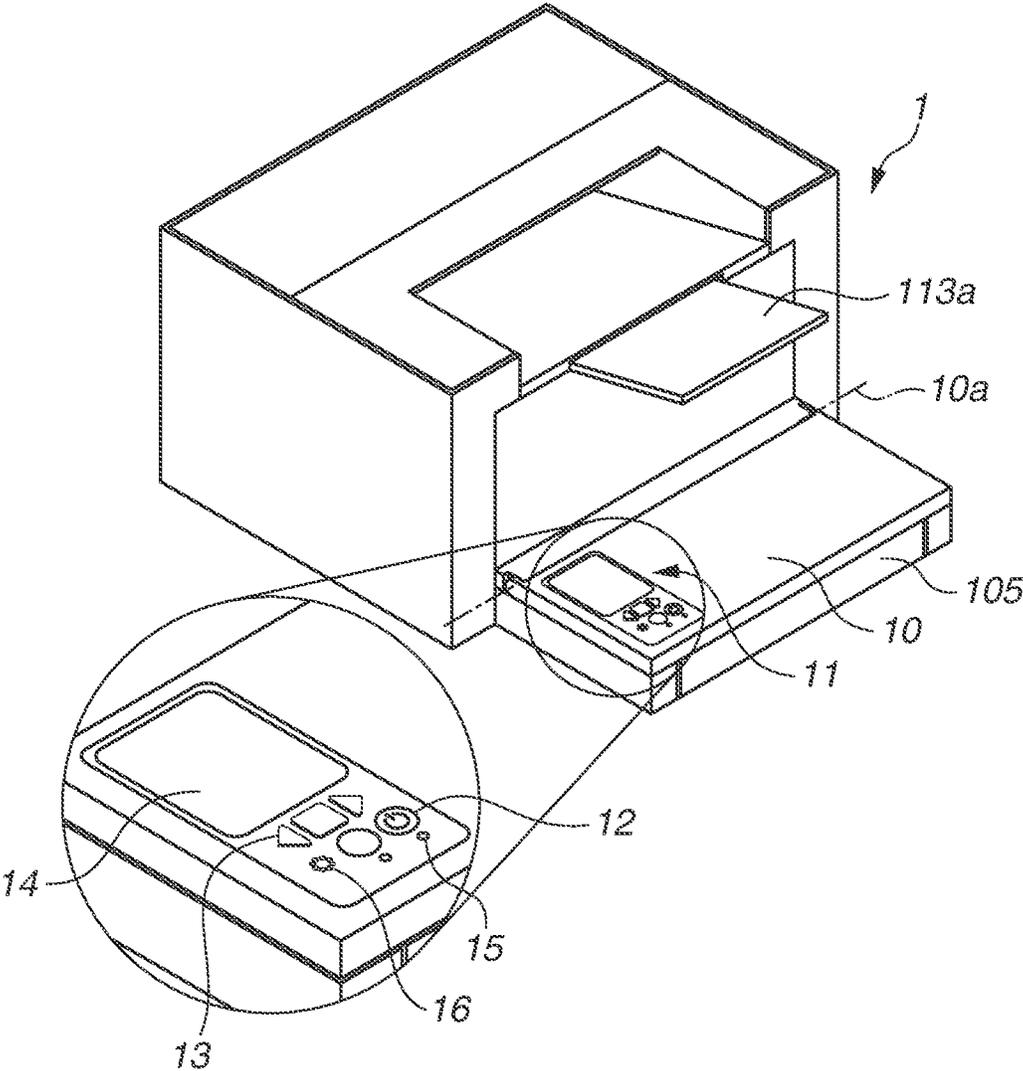


FIG.2

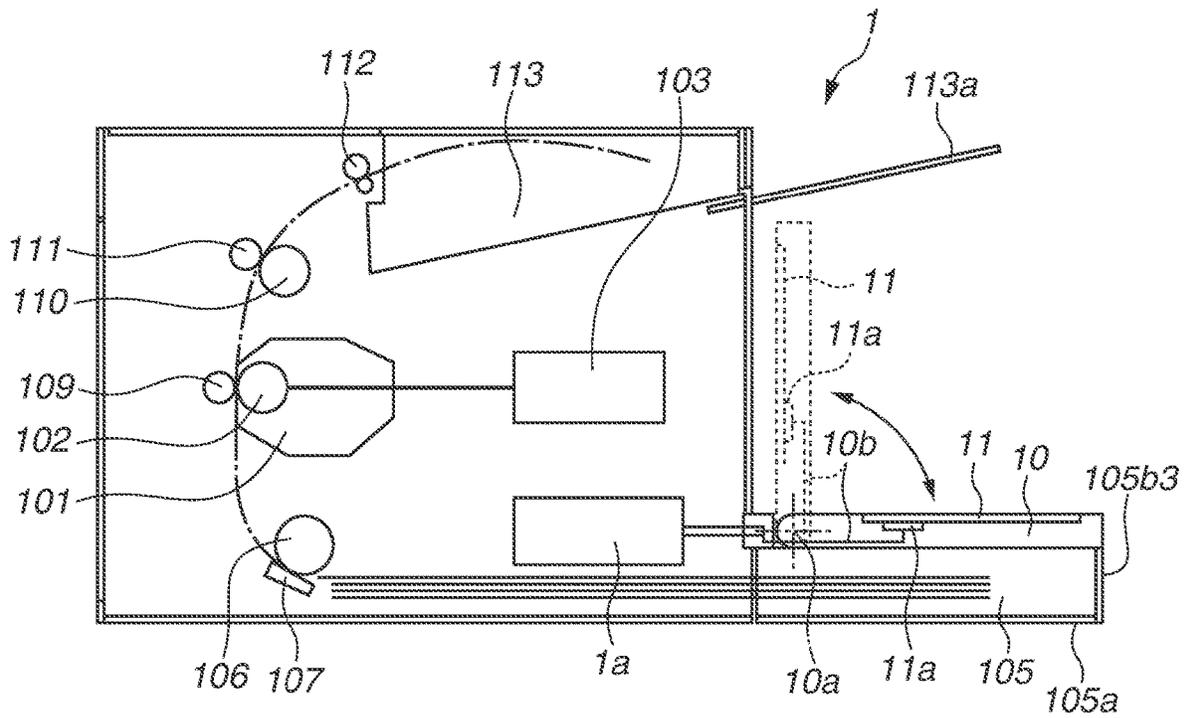


FIG.3A

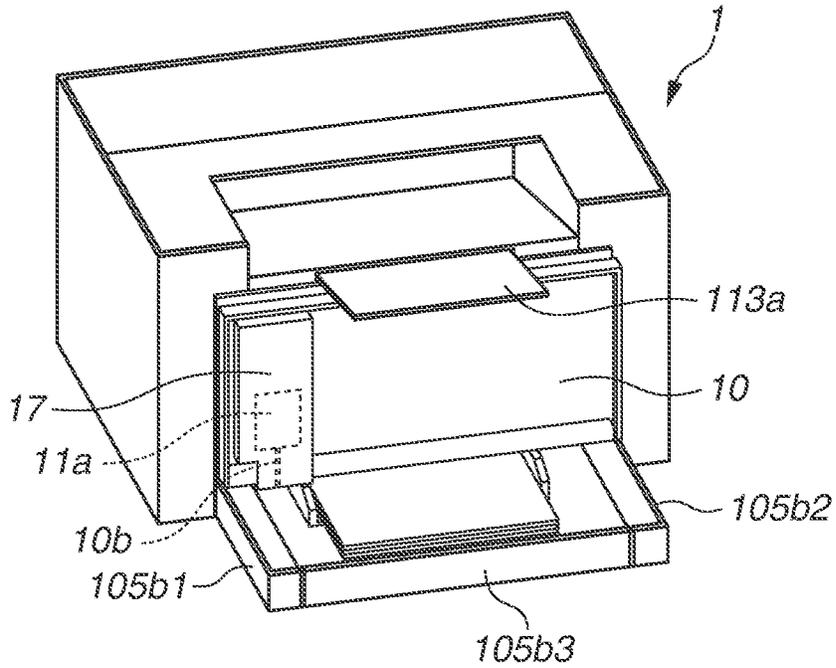


FIG.3B

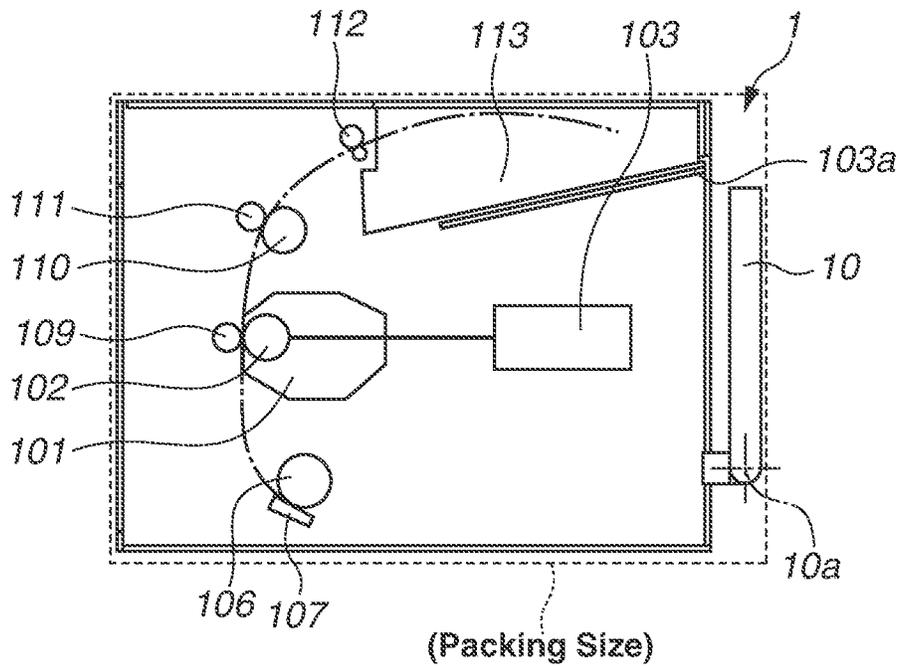


FIG. 4

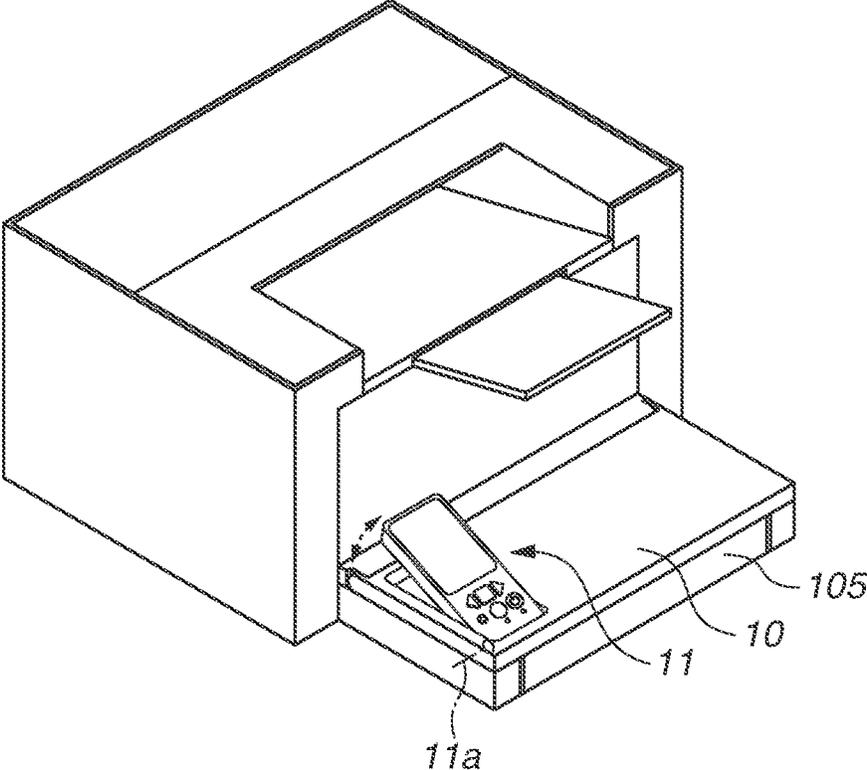


FIG. 5

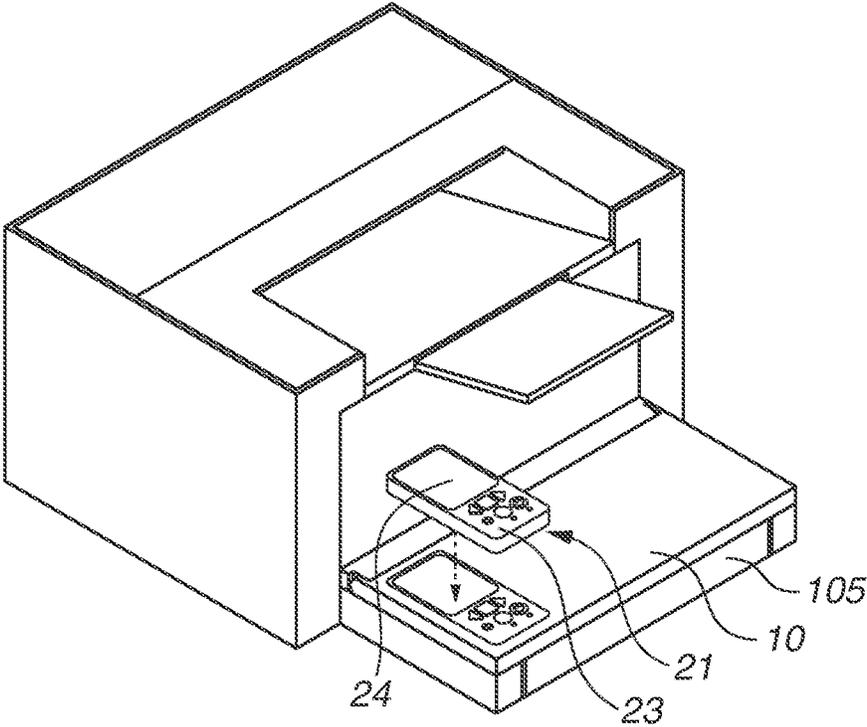


FIG.6

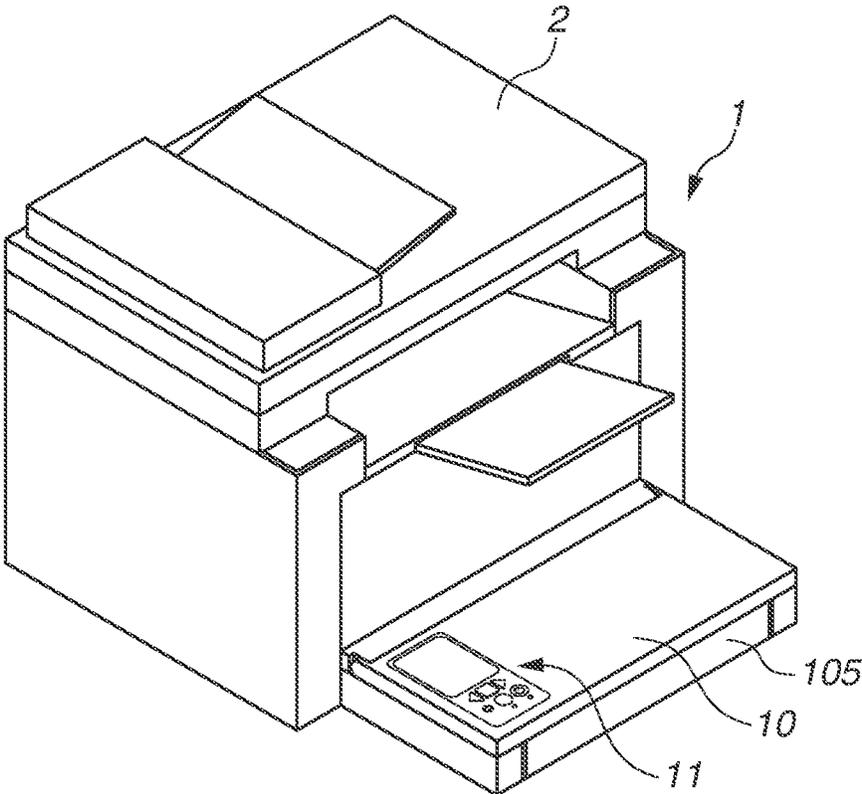


FIG. 7

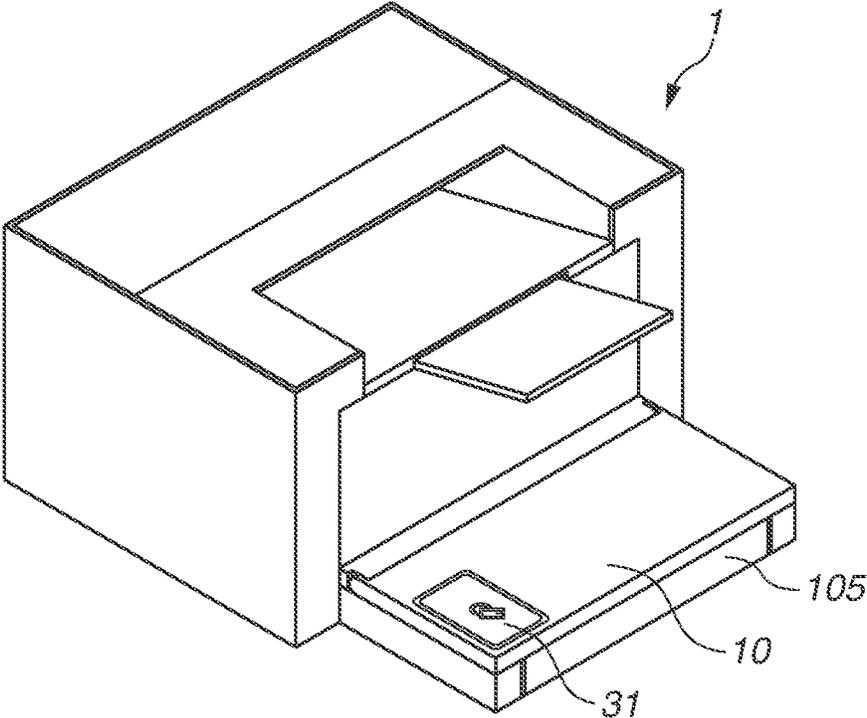
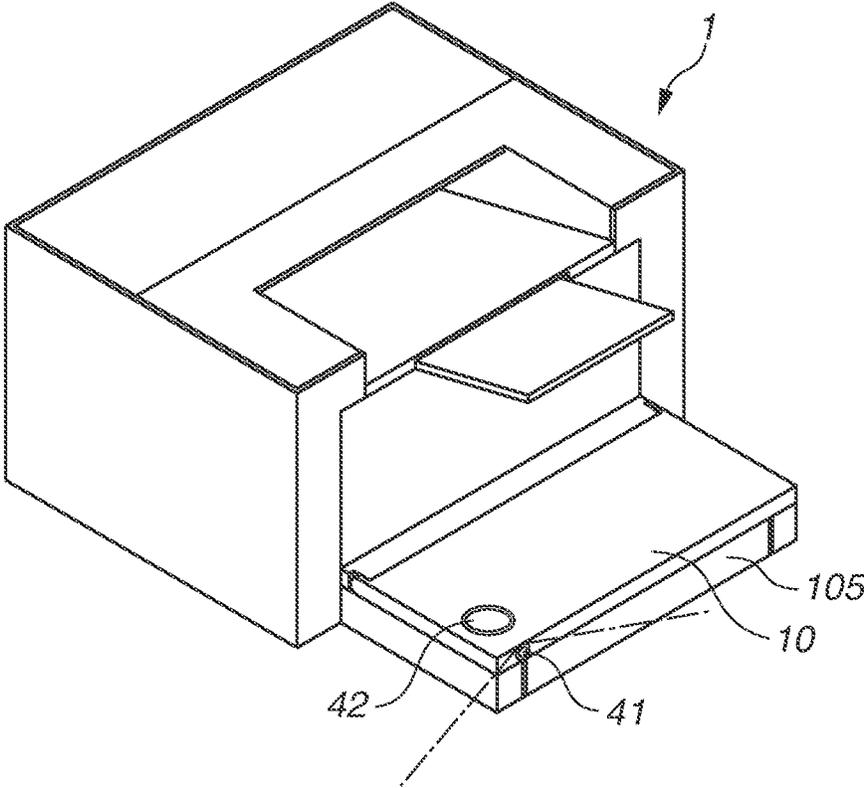


FIG. 8



1

IMAGE FORMING APPARATUS INCLUDING USER INTERFACE UNIT FOR INPUTTING OR OUTPUTTING INFORMATION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an image forming apparatus that forms an image on a recording medium. In particular, the image forming apparatus includes a user interface unit for inputting or outputting information.

Description of the Related Art

Conventionally, a printer that is an image forming apparatus includes an operation unit having a plurality of operation keys to be operated by a user, and a display unit that displays information to users using a liquid crystal panel and a light emitting diode (LED). The operation unit and the display unit are disposed on an upper surface or a front surface of the main body of the image forming apparatus in order to keep the visibility of the display unit appropriate and enhance the operability of the operation unit (Japanese Patent Laid-Open No. 2000-015891).

In recent years, there has been discussed a configuration including a large display unit to improve visibility and a configuration including a large touch panel to improve operability and visibility. In addition, there has been discussed a configuration including various user interfaces such as a motion sensor, a biometric sensor, and a port for wireless communication such as near field communication (NFC), besides an operation unit and a display unit. These user interfaces are often disposed on a top surface or a front surface of the main body of the image forming apparatus in order to achieve a configuration in which visibility and operability are further improved for users.

Meanwhile, downsizing of the image forming apparatus has been desired. The top surface and the front surface of the main body of the image forming apparatus each have an area where a user interface can be disposed without impairing visibility and operability for users, but in recent years, this area has been reduced.

Therefore, it has been desired to provide an image forming apparatus that allows various user interfaces to be disposed thereon without impairing the visibility and the operability of the user interfaces, while achieving downsizing of the image forming apparatus.

SUMMARY OF THE INVENTION

According to an aspect of the present invention, an image forming apparatus includes an image forming unit configured to form an image on a recording material, a controller configured to control the image forming unit, a sheet feeding tray configured to store a recording material to be supplied to the image forming unit, and a sheet feeding tray cover configured to cover an access point of the sheet feeding tray. The sheet feeding tray cover includes a user interface unit for inputting information into the controller or outputting information from the controller.

Further features of the present invention will become apparent from the following description of exemplary embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view schematically illustrating an image forming apparatus according to a first exemplary embodiment.

2

FIG. 2 is a cross-sectional view schematically illustrating a basic configuration of the image forming apparatus according to the first exemplary embodiment.

FIG. 3A is a perspective view schematically illustrating the image forming apparatus according to the first exemplary embodiment in a state where a sheet feeding tray cover is open.

FIG. 3B is a cross-sectional view schematically illustrating the image forming apparatus according to the first exemplary embodiment in the state where the sheet feeding tray cover is open.

FIG. 4 is a perspective view schematically illustrating a movable operation unit of an image forming apparatus according to a modification of the first exemplary embodiment.

FIG. 5 is a perspective view schematically illustrating an image forming apparatus according to a modification of the first exemplary embodiment.

FIG. 6 is a perspective view schematically illustrating a multifunction peripheral including an image reading scanner as an image forming apparatus according to a modification of the first exemplary embodiment.

FIG. 7 is a perspective view schematically illustrating an image forming apparatus according to a second exemplary embodiment.

FIG. 8 is a perspective view schematically illustrating an image forming apparatus according to a modification of the second exemplary embodiment.

DESCRIPTION OF THE EMBODIMENTS

Hereinafter, embodiments will be described in detail with reference to the attached drawings. Note, the following embodiments are not intended to limit the scope of the claimed invention. Multiple features are described in the embodiments, but limitation is not made an invention that requires all such features, and multiple such features may be combined as appropriate. Furthermore, in the attached drawings, the same reference numerals are given to the same or similar configurations, and redundant description thereof is omitted. Each of the embodiments of the present invention described below can be implemented solely or as a combination of a plurality of the embodiments. Also, features from different embodiments can be combined where necessary or where the combination of elements or features from individual embodiments in a single embodiment is beneficial.

First Exemplary Embodiment

A printer **1** serving as an image forming apparatus according to the first exemplary embodiment of the present invention will be described with reference to FIGS. 1 to 3B. In the following description, an up-down direction is defined based on the upper side and the lower side in the vertical direction as up and down, respectively. Further, a front-back direction is defined based on the front side and the back side of the printer **1** as front and back, respectively. Furthermore, a left-right direction is defined based on the left side and the right side of the printer **1** as left and right, respectively, in a state where the printer **1** is viewed from the front of the printer **1** in the backward direction. The printer **1** may have a controller (e.g. CPU, processor, processing circuitry, control circuitry) configured to control an image forming unit.

First, a basic configuration and operation of the printer **1** will be described with reference to FIG. 2. The printer **1** is a laser beam printer to which a cartridge **101** is attached, and thereby forms an image by an electrophotographic method

and records the image on a recording material such as paper. The printer 1 includes a sheet feeding tray 105, a sheet-feeding/conveyance unit, an image forming unit and a fixing unit.

The sheet feeding tray 105 is provided in a lower part of the printer 1 and stores therein recording materials on which an image is to be formed. The sheet-feeding/conveyance unit separates the recording materials in the sheet feeding tray 105 one by one using a sheet feeding roller 106 and a sheet separation unit 107, and supplies the recording material to the image forming unit. Afterward, the sheet-feeding/conveyance unit conveys the recording material to a sheet discharge stacking portion 113 disposed in an upper part of the printer 1 via the fixing unit, or conveys the recording material to a sheet discharge extension tray 113a drawn from the sheet discharge stacking portion 113 and the main body of the printer 1.

The image forming unit includes a scanner unit 103 that emits a laser beam based on image information, the cartridge 101 that forms a toner image, and a transfer roller 109 that transfers the toner image to the recording material.

The cartridge 101 includes a housing, a photosensitive drum 102 rotatably disposed in the housing, and a charging unit (not illustrated) that charges a surface of the photosensitive drum 102, and a developing unit that forms a toner image using a toner serving as a developer on the surface of the photosensitive drum 102. The transfer roller 109 is disposed to face the photosensitive drum 102 of the cartridge 101 and forms a transfer nip portion with the photosensitive drum 102.

The fixing unit includes a fixing film 110, a pressure roller 111 and a heater (not illustrated). The pressure roller 111 is in pressure contact with the fixing film 110. A fixing nip portion is thereby formed. The fixing unit is thus configured such that a fixing nip portion is formed therebetween.

When the printer 1 receives a print signal from a host computer (not illustrated), the image forming unit irradiates the surface of the photosensitive drum 102 charged by the charging unit with a laser beam from the scanner unit 103 based on image information from the host computer and thereby forms an electrostatic latent image thereon. The electrostatic latent image corresponding to the image information is developed using the toner in the developing unit, so that a toner image is formed. Meanwhile, when the print signal is received from the host computer (not illustrated), the sheet-feeding/conveyance unit separates the recording materials in the sheet feeding tray 105 one by one using the sheet feeding roller 106 and the sheet separation unit 107 to feed the recording material. The sheet-feeding/conveyance unit then conveys the separated recording material to a transfer nip portion. The transfer nip portion is formed by the photosensitive drum 102 and the transfer roller 109 that are in pressure contact with each other. The toner image on the photosensitive drum 102 is transferred to the recording material at the transfer nip portion. The recording material to which the toner image is transferred is conveyed to the fixing nip portion formed by the fixing film 110 and the pressure roller 111. At the fixing nip portion, the recording material to which the toner image is transferred is heated by the heater and pressed by the fixing film 110 and the pressure roller 111, so that the toner image is fixed onto the recording material. The recording material on which the toner image is fixed is conveyed by a sheet discharge roller pair 112 of the sheet-feeding/conveyance unit and then discharged to the sheet discharge stacking portion 113 disposed in the upper part of the printer 1, or to the sheet discharge stacking

portion 113 and the sheet discharge extension tray 113a, and hence the image formation on the recording material is completed.

(Sheet Feeding Tray)

Next, a configuration of the sheet feeding tray 105 of the present exemplary embodiment will be described.

As illustrated in FIG. 1, the sheet feeding tray 105 is provided in the lower part of the main body of the printer 1 such that the sheet feeding tray 105 protrudes from the front of the main body of the printer 1. As a result of downsizing the printer 1, the depth of the printer 1 in the front-back direction is shorter than the length in a conveyance direction of a recording material on which an image can be formed. For this reason, in a state where a recording material on which an image is to be formed is placed in the printer 1, the rear edge of the recording material protrudes from the front surface of the printer 1. The sheet feeding tray 105 is thus provided to store at least the rear edge of the recording material protruding from the main body of the printer 1. A sheet feeding tray cover 10 is disposed on the sheet feeding tray 105. The sheet feeding tray cover 10 is provided to cover recording materials stored in the sheet feeding tray 105.

The sheet feeding tray 105 includes a stacking face 105a on which recording materials are stacked, a left face 105b1, a right face 105b2 and a front face 105b3. The left face 105b1, the right face 105b2, and the front face 105b3 are disposed around the stacking face 105a to protrude from the stacking face 105a upward in the vertical direction. In this way, the left face 105b1, the right face 105b2, and the front face 105b3 are configured to support the sheet feeding tray cover 10 in a state where the sheet feeding tray cover 10 covers an access point of the sheet feeding tray 105.

One end of the sheet feeding tray cover 10 is connected to the main body of the printer 1 so that the sheet feeding tray cover 10 is rotatable around a hinge center 10a relative to the main body of the printer 1. In normal printing, the sheet feeding tray cover 10 covers the sheet feeding tray 105. When a user places recording materials in the sheet feeding tray 105, a user brings the sheet feeding tray cover 10 into a state illustrated in FIG. 2 (with broken lines) and FIG. 3A by rotating the sheet feeding tray cover 10 around the hinge center 10a relative to the main body of the printer 1. In this way, the inside (the stacking face 105a) of the sheet feeding tray 105 where the recording materials are stacked becomes visible to the user, so that the user can replenish recording materials in the sheet feeding tray 105.

(User Interface)

The printer 1 is provided with various user interface units (hereinafter referred to as user interfaces). A user interface is provided for inputting information in the image forming unit by the user, for outputting information from the image forming unit to notify the user of the information, and for performing at least one of inputting and outputting of information.

In the present exemplary embodiment, an operation unit 11 serving as a user interface is disposed on the top surface of the sheet feeding tray cover 10. The operation unit 11 includes a power switch 12, a plurality of operation keys 13, a display portion 14, a power light emitting diode (LED) 15, and a speaker 16. In this way, the operation unit 11 having a plurality of functions is provided as a user interface in the present exemplary embodiment. The user interface unit may be configured to input information into a controller or output information from the controller. The controller and the user interface unit may be connected by a flexible wiring. The

controller and the user interface unit may be connected by wireless communication in which information is transmitted by radio waves.

When the user uses the printer 1, the user presses the power switch 12 so that the main body of the printer 1 is powered on and the power LED 15 is lit. This enables the user to easily recognize the power ON or OFF state. The display portion 14 displays information about the printer 1, such as various settings, a network status, and the content of an error. When the user performs operations such as paper type setting, sheet feeding slot setting, various modes setting, and resetting, the operations can be performed using the various operation keys 13 as appropriate. The speaker 16 serving as a sound output device in the operation unit 11 is configured to output an operation sound, a notification sound and an audio guide. As the operation keys in the present exemplary embodiment, components by which the user causes a change in an electric circuit of the image forming apparatus are employed. However, the operation keys may not be mechanical push switches and may be replaced by a resistive-type (pressure-type) input device such as a capacitive-type touch panel.

The operation unit 11 contains an electric board 11a, and the electric board 11a is connected to a signal processor 1a (controller) of the image forming unit (the main body of the printer 1) by electric wiring 10b. Flexible wiring, such as a flat cable or flexible printed circuits (FPC), may be used as the electric wiring 10b. One end of the electric wiring 10b is connected to the electric board 11a. The other end of the electric wiring 10b is connected to the signal processor 1a of the image forming unit (the main body of the printer 1). The electric wiring 10b may be disposed to run near the hinge center 10a. In this way, the electric wiring 10b may have flexibility. When the sheet feeding tray cover 10 is rotated, the electric wiring 10b bends following the sheet feeding tray cover 10. That is, the electric wiring 10b bends in response to the movement of the sheet feeding tray cover 10. With this configuration, the electric wiring 10b can connect the electric board 11a and the signal processor 1a more reliably without disconnection.

The back surface portion of the operation unit 11 is protected by an operation unit rear cover 17 that covers the electric board 11a and the electric wiring 10b. The sheet feeding tray cover 10 is configured such that the rotation thereof is regulated at a position where the sheet feeding tray cover 10 extends in the vertical direction along the front surface of the printer 1. Thus, when the user places recording materials in the sheet feeding tray 105, the sheet feeding tray cover 10 is maintained such that the inside (the stacking face 105a) of the sheet feeding tray 105 is exposed, thereby improving the user's workability. In addition, the sheet feeding tray 105 may be detachable from the printer 1. The sheet discharge extension tray 113a is storable inside the printer 1. The sheet feeding tray cover 10 can be in a state where the sheet feeding tray cover 10 extends in the vertical direction along the front surface of the printer 1. Therefore, even where the operation unit 11 is provided in the sheet feeding tray cover 10, it is possible to not only reduce the installation space for the printer 1 when the printer 1 is not in use, but also prevent an increase in the packing size of the printer 1 at the time of transportation. This is illustrated in, for example, FIG. 3B.

According to this configuration, the operation unit 11 is disposed on the top surface of the sheet feeding tray cover 10 where the operation unit is easily accessible, so that the operation unit 11 of the printer 1 is easily viewable. This therefore makes it possible to improve the user's visibility of

the operation unit 11. In the printer 1, typically, it is expected that a sufficient distance is maintained between the top surface of the printer 1 and the top surface of the space where the printer 1 is housed, and the operation unit 11 is operatively disposed thereon. Particularly, in this configuration, a sufficient space is secured above the operation unit 11, and operability for the user is not easily impaired. Therefore, restrictions in installing the printer 1, such as the need to install the printer 1 so as not to impair the operability for the user, are reduced, and the flexibility of the installation of the printer 1 increases. In other words, a configuration in which the operation unit 11 is provided in an area where both of the operability and the visibility can be satisfied is realized even if the printer 1 is downsized. For example, it is not necessary to have a protrusion for improving the visibility, so that the flexibility of the design of the printer 1 can be increased. Therefore, according to the present exemplary embodiment, it is possible to dispose various user interfaces without impairing the visibility and the operability of the user interfaces, while downsizing the image forming apparatus. The operation unit 11 may be located on the upper surface of the sheet feeding tray cover 10, which can only be accessed when the sheet feeding tray cover 10 is in an open position, allowing access to the sheet feeding tray 105.

In the present exemplary embodiment, the configuration in which the operation unit 11 having the plurality of functions is included as the user interface is adopted, but this is only an example. The user interface only needs to include at least one of notification units that each notify the user of information visually by emitting light using a lamp or an image display portion, or aurally by emitting a sound from a speaker, in addition to a button such as a push button and a switch such as a toggle switch. Therefore, the user interface may be an operation panel (a touch panel) on which information can be input by touching the image display portion.

Further, the operation unit 11 in the present exemplary embodiment has been described as a unit fixed to the sheet feeding tray cover 10, but the configuration is not limited thereto. As illustrated in FIG. 4, there may be adopted such a configuration that the operation unit 11 is rotatable around an arbitrary support shaft (e.g., the hinge center 10a) on an end portion thereof and the operation unit 11 is tilted by an arbitrary angle relative to the horizontal plane to make the operation unit 11 face forward.

Further, as illustrated in FIG. 5, a configuration in which a wireless operation unit 21 is attachable to and detachable from a housing portion in the sheet feeding tray cover 10 may be adopted. In this case, the wireless operation unit 21 includes a display portion 24, various operation keys 23, and an electric board (not illustrated) disposed inside thereof, and is configured to communicate with the signal processor 1a disposed inside the main body of the printer 1.

The wireless operation unit 21 (the electric board) and the main body (the signal processor 1a) of the printer 1 may be configured to communicate with each other using infrared rays, but the configuration is not limited thereto. Other communication method and communication circuit may be adopted appropriately, based on, for example, a usage environment such as ultrasonic waves or radio waves.

Further, in the present exemplary embodiment, the image forming apparatus is exemplified by the printer 1 not having an image reading device, but is not limited thereto. An image forming apparatus having an image reading device 2 and a facsimile function may be adopted as illustrated in FIG. 6. Furthermore, in the present exemplary embodiment, the image forming apparatus that forms an image in a laser

method is described as an example, but other image forming methods, such as an inkjet method or a thermal method, may be also used.

Second Exemplary Embodiment

The second exemplary embodiment of the present invention will be described. Configurations similar to those of the first exemplary embodiment will not be described.

In the first exemplary embodiment, the operation unit **11** is provided on the top surface of the sheet feeding tray cover **10**. In the present exemplary embodiment, a wireless communication port **31** is provided as the user interface, as illustrated in FIG. 7. The wireless communication port **31** is compliant with a standard for contactless wireless communication such as near field communication (NFC), and may be used to read information of a tag (e.g., a radio frequency identification chip) possessed by a user to perform user identification and the like. To be more specific, a configuration may be adopted, for example, in which tag information stored in an integrated circuit (IC) chip is acquired by placing a communication terminal (not illustrated), such as a card or portable terminal incorporating the IC chip and an antenna, over the wireless communication port **31** to perform the user identification. In this way, the user may place the communication terminal over the wireless communication port **31** of a printer **1** after transmitting print data to the printer **1** from a personal computer (PC), and the printer **1** may execute a print output operation after the user identification. This prevents a printed sheet from being taken out by a third party.

According to this configuration, the wireless communication port **31** is provided on the top surface of a sheet feeding tray cover **10**. This makes the wireless communication port **31** easily viewable and accessible by the user. In other words, the user can easily bring the communication terminal near to the wireless communication port **31**, so that the usability is improved. In addition, restrictions in installing the printer **1**, such as the need to install the printer **1** so as not to impair operability for the user, are reduced. In other words, the user can install the printer **1** more freely. The wireless communication port **31** is provided in an area where both of the operability and the visibility can be satisfied even in the downsized printer **1**. For example, it is not necessary for the printer **1** to have a protrusion for improving the visibility, so that the flexibility of the design of the printer **1** can be increased. Therefore, according to the present exemplary embodiment, it is possible to dispose various user interfaces in an image forming apparatus without impairing the visibility and the operability of the user interfaces, while achieving downsizing of the image forming apparatus.

In the present exemplary embodiment, near field wireless communication compliant with the NFC standard is used as a method of communication between the portable terminal and the wireless communication port **31**. However, the method of communication is not limited thereto. The communication between the portable terminal and the wireless communication port **31** may be, for example, a method of transmitting information by radio waves in compliance with another communication standard, or may be communication compliant with a contactless wireless communication standard such as Wireless Fidelity (Wi-Fi) (a wireless local area network (LAN)) or Bluetooth®. According to this configuration, the wireless communication port **31** can be disposed at a position away from the main body of the printer **1**, so that the influence of radiation noise emitted from the printer **1** is reduced, thereby making it possible to improve the

stability of the communication between the portable terminal and the wireless communication port **31**.

In the present exemplary embodiment, the wireless communication port **31** is provided to perform the user identification, but this is only an example. For example, as illustrated in FIG. 8, a fingerprint sensor **42** may be disposed on the top surface of the sheet feeding tray cover **10**. A user places a finger over the fingerprint sensor **42**, so that the fingerprint sensor **42** detects fingerprint information of the user, and user identification is performed by comparing the detected fingerprint information with pre-registered fingerprint information of the user. In this way, the user may place a finger over the fingerprint sensor **42** of the printer **1** after transmitting print data to the printer **1** from a PC. When the user identification is successful, the printer **1** executes a print output operation. This prevents a printed sheet from being taken out by a third party.

According to this configuration, the fingerprint sensor **42** is disposed on the top surface of the sheet feeding tray cover **10**. This makes the wireless communication port **31** easily viewable and accessible by the user. As a result, the usability is improved.

The case where the fingerprint sensor **42** is used as the interface for performing the user identification has been described as an example, but this is only an example. For example, a sensor that can detect biometric information of the user such as iris, retina, vein, and voiceprint may be disposed on the top surface of the sheet feeding tray cover **10**. In this case, the printer **1** compares information obtained by the sensor with pre-registered information to perform user identification. In this case as well, it is easy for the user to visually recognize the sensor and have access thereto. The usability is therefore improved. Moreover, the biometric information can be detected more reliably. In particular, in a case where the user identification is performed by voiceprint, voiceprint, i.e., user's voice, can be detected at a position away from the printer **1** by disposing the sensor at the top surface of the sheet feeding tray cover **10**. The influence of a sound generated from the printer **1** is reduced, so that user's voice can be detected at a position closer to the user.

Further, as illustrated in FIG. 8, a motion sensor **41** may be disposed on the sheet feeding tray cover **10** as a user interface. In this way, the user interface is not limited to a user interface by which a user can directly input information, and may be a user interface that enables detection of information related to a user, such as the presence or absence of a user who can provide an image formation instruction to the printer **1**.

The printer **1** has a plurality of power supply modes such as a sleep mode for reducing power consumption, a standby mode in which a printing operation is in a preparation phase, and a print mode in which printing is in progress. Normally, the printer **1** changes to the sleep mode after a predetermined time has elapsed without performing any printing operation. In a case where a printing operation is performed again, the printer **1** changes to the standby mode in response to some trigger to the printer **1**, such as operation of a button or an input from a sensor.

The motion sensor **41** may be a device that detects a movement of a person (a movable body) near the printer **1**. In this case, when the motion sensor **41** detects a movement of a person (a movable body) within a detection area, the printer **1** cancels the sleep mode and changes to the standby mode. In other words, the printer **1** changes from the sleep mode to the standby mode without waiting for an operation

by the user. As a result, a waiting time for changing from the sleep mode to the standby mode is reduced, so that the usability is improved.

AS described above, if the motion sensor **41** is provided on the sheet feeding tray cover **10**, obstructions that hinder the detection by the motion sensor **41** are reduced. The motion sensor **41** therefore can detect the presence or absence of a person (a movable body) in a wide area. In other words, the necessity for providing a protrusion in the printer **1** to enhance the detectability of the motion sensor **41** is decreased, and thus the flexibility of the design of the printer **1** increases. Moreover, restrictions in an installation location of the printer **1** are reduced, so that the flexibility of the installation of the printer **1** increases. According to the present exemplary embodiment, it is possible to dispose various user interfaces in an information forming apparatus without impairing the visibility and the operability of the user interfaces, and at the same time, downsizing of the image forming apparatus can be achieved.

While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

This application claims the benefit of Japanese Patent Application No. 2020-052383, filed Mar. 24, 2020 which is hereby incorporated by reference herein in its entirety.

What is claimed is:

1. An image forming apparatus comprising:
 - an image forming unit configured to form an image on a recording material;
 - a signal processor configured to control the image forming unit;
 - a sheet feeding tray configured to store a recording material to be supplied to the image forming unit, wherein the sheet feeding tray protrudes from a main body including the image forming unit and the signal processor;
 - a cover configured to cover the recording material stored on the sheet feeding tray; and
 - a user interface unit provided on the cover, and for inputting information into the signal processor or outputting information from the signal processor, wherein the cover is connected to the main body and is rotatable relative to the main body, and

wherein, when viewed in a direction perpendicular to a stacking face of the sheet feeding tray on which the recording material is stacked, the signal processor and the cover do not overlap each other.

2. The image forming apparatus according to claim 1, wherein the user interface unit is located on an upper surface of the cover in the direction perpendicular to the stacking face.

3. The image forming apparatus according to claim 1, wherein the signal processor and the user interface unit are connected by a flexible wiring, and wherein, when the cover is rotated, the flexible wiring bends in response to movement of the cover.

4. The image forming apparatus according to claim 3, further comprising a back cover configured to cover the flexible wiring from a back side of the cover.

5. The image forming apparatus according to claim 1, wherein, in a case where communicated information is transmitted by radio waves, the signal processor and the user interface unit are connected by wireless communication of the radio wave transmitted communicated information.

6. The image forming apparatus according to claim 1, wherein the user interface unit includes a power switch of the image forming apparatus.

7. The image forming apparatus according to claim 1, wherein the user interface unit includes an input device by which the information input is into the signal processor is input according to a user operation.

8. The image forming apparatus according to claim 1, wherein the user interface unit includes a wireless communication circuit for acquiring tag information of a portable terminal by wireless communication.

9. The image forming apparatus according to claim 1, wherein the user interface unit includes a sensor configured to detect movement of a person.

10. The image forming apparatus according to claim 1, wherein the user interface unit includes a sensor configured to detect biometric information for user identification.

11. The image forming apparatus according to claim 1, wherein the user interface unit includes a display device configured to display the information that is output from the signal processor.

12. The image forming apparatus according to claim 1, wherein the user interface unit includes a sound output device configured to notify a user by sound of the information that is output from the signal processor.

* * * * *